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ABSTRACT

Integration of the World Wide Web in instruction involves finding and retrieving resources on the Web, communicating, developing teaching and learning activities using the Web, and publishing on it. Related issues and concerns include: (1) finding sufficient time and developing good plans are critical for Web integration; (2) students' involvement is the key to the success of Web implementation; (3) useful Web resources are hard to come by; (4) the Web should not be used solely for disseminating course materials; (5) access to the Web is essential for curriculum integration; (6) schools should create a policy for proper use of the Web; and (7) design a Web page with a good purpose. Suggestions for optimizing the Web for effective instruction include to plan Web-based learning activities ahead of time; relate Web resources with learning contents and develop instructional activities on the Web; watch for proper use of Web resources; conduct formative and summative evaluation on students' performances; encourage communication via collaboration and cooperation; have students keep a log about what they have experienced to increase efficiency and effectiveness for Web exploration; and consider the needs of the audience when organizing and publishing Web pages. (AEF)

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Optimize the Web for Better Instruction

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The Internet continues to grow in education. In the past few years, the use of the Internet among university faculty and students has soared. Listservs, Web-based courses, and e-mail have become an important aspect in college-level courses. Internet developments, especially the World Wide Web (WWW or the web) offer a great potential to improve instructional practice. A wide variety of tasks may be designed and developed by teachers to integrate the web into curriculum and to engage students in dynamic activities such as exploration, research, discussion, planning, cultural awareness, and publication.

Although many people hold a high hope that the Web will bring tremendous changes in education,, in reality, using the web for instruction is not an easy task. There are many obstacles for web implementation in the school. Lynch and Horton (1997) highlight a few weaknesses the web has presented—being awfully slow, demanding lots of memory, bandwidth limitations, and the expense required to upgrade and to maintain. Monke (1997) also describes the common reality and frustration in school uses of the web, "The education community has been bombarded with hype about the information highway. But in practice, the connections are often unreliable, the interfaces unintuitive, the documentation unintelligible, the information unfindable. And when we do get the systems working, the technology changes so fast that we never feel fully confident about what we are doing." (p. 30)

Issues and concerns

The integration of the web in instruction should involve the following types of tasks: finding resources on the web, retrieving resources from the web, communicating, developing teaching and learning activities using the web, and publishing on the web. These tasks match what Flake (1996) identified as the four key areas of the Internet skills. To integrate the web into instruction successfully, we must take into consideration many concerns and issues related to real life practice. In addition to the above-mentioned issues of the stability and speed in web implementation, many other issues such as resource appropriateness, pedagogical and curricular considerations, designing and publishing effectiveness, and the cognitive impact are of equal or even more importance and deserve much attention. These issues and concerns are presented as follows.

Finding sufficient time and developing good plans are critical for web integration.

Cruising on the web to search for resources can be time-consuming. Developing or maintaining web pages is even more time-consuming. To integrate the web for effective instruction requires thorough planning and extensive experimentation. For example, to engage students in active exploration on the web, teachers should develop learning activities that can link the learning contents to students' prior experiences. Teachers will have to explore all the potential web resources prior to students' exploration. As another example, to develop a good web page, one should plan ahead of time and develop a template containing necessary components so that the web page will meet the intended expectation and can be easy to maintain. Sound web pages will require constant modifications and maintenance.

Students' involvement is the key to the success of web implementation.

When using the web for instruction, students should not be the passive information receivers. To engage students in active learning, teachers should assign students to explore resources, to formulate discussion, and to organize their own information for on-line publication. An elementary school technology coordinator in the southeast Wisconsin, for example, trained some enthusiastic fourth and fifth graders to become technology class helpers who constructed web pages for teachers, classes, and the entire school. They also functioned as teachers' technology assistants. These students, functioning as seed students, continue to grow, help, and influence other students and teachers. Before long the entire school became heavily involved in the web implementation.

Useful web resources are hard to come by.

Teachers should be careful in examining the resources retrieved from the web to ensure that they match the teaching and learning objectives. Many web-using teachers share a serious concern about the inadequacy of the web information to meet the instructional needs. Although there are many resources on the web, most

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teachers probably will agree that it is difficult to locate pertinent information to serve the instructional needs. Oftentimes the contents of the resources found on the web are irrelevant, incomplete, or inappropriate.

To locate useful information, critical thinking and problem-solving skills need to be incorporated into the learning process. Users need to develop good strategies of using the on-line search engines to simplify the tasks. Users should learn to choose a proper keyword or combination of keywords for smart search. They sometimes will have to choose different search engines to locate what they need to find. Finding web resources requires time, patience, and practice to excel.

The web should not be used solely for disseminating course materials.

Some administrators advocate saving printing costs by promoting a practice of using the web to display instructional materials and course information. According to such an advocacy, instructors do not give out handouts in class, instead, they put instructional information and materials on the web. Students are required to log onto the web to browse the information as needed. In most cases, as a result, students simply log onto the web, find the information, and print it out from the school printers. It cost even more than using the Xerox machine. Such a policy does not provide students any good motivation to explore the web for learning. Incidentally, such a practice will take teachers plenty of time to put information on the web.

Access to the web is essential for curriculum integration.

An urban school district administrator boasted that his school district had the Internet access way ahead of other school districts. In fact, the teachers from this district revealed the truth that they had only one slow phone line connection in the library which no teacher could access. Inconvenient access is equal to no access. If we want to fully exploit the power of the web for instruction, learners must be provided with an easy access to the web. At present, schools are not well-equipped with the web technology. Most teachers do not have an adequate access to the needed hardware and software resources to support the web-based instruction. In addition, poor scheduling and time management often aggravate the situation.

To increase Internet access, an innovative approach may be developed through cooperation and collaboration between school, community, and universities. Writing small grants to seek community and business contribution may result in financial support to the web access in the school. Teachers and university professors can also work together to explore potential collaboration such as enriching public school students' learning experience by taking a field trip to the university computer lab, or to develop a continuing project that connects the college professional development experience with the public school via the web.

School should create a policy for proper use on the web.

The web has opened a door for misuses. The web is an untamed area where we could bump into almost anything that we may imagine. With the vast variety of the web, two main issues that concern education are the security issue and the copyright issue. Most people believe it is not safe to do transactions on the web. Many teachers, parents, and administrators have expressed their concerns about releasing individual information such as names, addresses, phone numbers, and pictures on the web. Many individuals become aware that a third party in cyberspace might be looking while they are browsing on the web. Individual information becomes vulnerable and insecure.

The problem of pornography, another serious issue, has become pervasive and controversial. Several computer companies have formed the Information Highway Parental Empowerment Group to create standards for software filters that make it possible for teachers and parents to restrict children's access. The controversy over privacy and freedom of speech versus the cyberporn restriction may become a debatable issue and remain unresolved for many years to come. However, an appropriate guideline must be in place to restrict undesirable behavior.

Also, many teachers are concerned about the quality of homework such as the research paper. Individual users can easily copy the resources they have browsed. To fulfill the assignment requirement, students may log into the web and retrieve a portion of an article and paste it into their own research paper. A clear school policy about fair use regarding copyright and plagiarism violation should be established. Copyright issues should be clearly addressed with students so that they know the differences between free resources and copyrighted materials, and know how to properly use and cite other people's work or ideas.

Design a web page with a good purpose.

After learning how to construct a web page, a practicing teacher commented, "Although the process of generating a web page has been made easy, it is still very difficult to develop a good and useful web page." Simply putting text, graphics, or multimedia elements onto a web does not necessarily make it a meaningful and worthwhile product. To make a significant web page, we have to design the page by taking full advantage of the unique characteristics the web can provide. For example, one of the most exciting aspects of web-enhanced instruction is that teachers are able to organize instructional information and include all the relevant references by easily linking to other well-developed sites.

Another important element for a good web page is the inclusion of valuable content to satisfy users' needs. We have to think from the users' point of view about what they

like to see on the web. Since we have seen some web pages as considered as a waste of time or of no value, why do we want to create the same kinds of junk pages? Teaching students to compose a web page, teachers should focus on not only the mechanical part of the designing and development, but also the meaningful contents as well as the global hypertext structure that allows users to cruise around to find relevant information easily.

Other rules of thumb include the basic instructional design and screen design theories. For example, the web page should contain more depth and interactivity for the resources so that teachers can engage students in extensive exploration and collaboration. In addition, the web page should be made intuitive and self-explanatory. The web page designer should also be sensitive to the needs of hardware and software on the users' sides. Undesirable or irrelevant, big graphics should be avoided, and alternatives for unsupported functions or plug-ins should be provided. A good web page for instruction is not only good-looking, exciting, considerate, but also conducive for learning.

Good practice to exploit the web

Good practice to implement the web for instruction requires good planning so that students can concentrate on learning materials and activities within budgeted time. As witnessed by the author, a group of college students were sent to the computer lab to research a certain topic on the web. After an hour, they reconvened in the classroom to talk about what they had learned. Surprisingly, most students did not seem to have achieved much in their experience. They could only contribute to a shallow discussion. With limited time for exploring, it is difficult to stay focused unless a well-organized plan is provided. Otherwise, students will very likely be distracted by other items that caught their eyes.

The web has facilitated an exciting way to engage students in active learning. Contrary to the traditional lecture and factual information memorization, the world wide web as an instructional tool allows student-centered learning where exploration and discussion may inspire students to find information to satisfy their curiosity. The web-based learning can meet individual's needs, motivate students to find resources, and to publish with a creative mind. It also promotes cooperation and collaboration.

Properly integrated, the web can make a huge impact on instruction. However, in many cases today, the web application in instruction still focuses on the mechanical aspect of learning. The courses place a great deal of effort on the following tasks: studying the new terminology, learning to use the web, cruising and finding information on the web, and composing and publishing on the web. Although these tasks are important, the web should not become an independent element in education. Instead, it should function as a supporting element to enhance the content teaching and learning.

Suggestions for optimizing the Web for effective instruction

The web has provided a great potential for instruction. However, in order to maximize the power of the web, we must carefully design and develop instructional activities so that students can benefit from using the web without wasting time. The following are some suggestions derived from the above discussion.

- Plan web-based learning activities ahead of time. Gather needed information. Organize meaningful learning activities to support the web exploration. Schedule needed computer time. Browse through all the suggested web resources before students do it. Prepare a Plan B just in case of the bad connection or some other unforeseen events.
- Relate the web resources with the learning contents and develop instructional activities on the web. Students should explore the web with a clear goal. Random or unprepared exploration on the web often result in a waste of time.
- Watch for proper use of the web resources. Discourage students from pirating ideas or materials from the web.
- Conduct formative and summative evaluation on students' performances. Browsing on the web does not necessarily constitute effective learning. Teachers should conduct needed assessment to monitor students' performance and progress.
- Encourage communication via collaboration and cooperation. The web is a great tool for students to share their own experience. The web-based activities should emphasize the importance of sharing. Teachers should encourage students to engage in active discussion, and creative and critical thinking which in turn may increase students' multicultural awareness.
- To increase efficiency and effectiveness for web exploration, ask students to keep a log about what they have experienced and narrow the focus to the desired resources only.
- When organizing and publishing web pages, authors should consider the needs of the audience. Put only useful and relevant information on the page. Minimize the multimedia elements which may consume too much computer resources to load. Organize information in a proper layout.

Summary

Although the world wide web has become a popular tool in education, to implement the web across the curriculum will require teachers to invest a tremendous effort. This paper addressed various issues regarding the use of the world wide web as an instructional tool. Based on the discussion, some suggestions are provided for optimizing web-based instruction. To sum up, we must overcome the

obstacles of the web access. We should develop innovative instructional activities to motivate students by maximizing the power and advantages that the web can provide.

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